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SCIENCE.—SUPPLEMENT.

FRIDAY, FEBRUARY 5, 1886.

FISH AND FAMINE IN INDIA.

FAMINE seems to threaten with destruction the people of no part of the world so often as that of India; and the query has often arisen in the mind of the writer why the fish-food of that great empire was not utilized in its prevention to a greater extent. The vast peninsula of Hindostan is surrounded by tropical seas; its shores are low, and indented by lagoons; its interior is penetrated by great rivers; its list of edible fishes is an exceedingly long one. It would seem as though more account ought to be made of this food-supply than appears to be the case.

Fishermen have formed a separate caste in India from earliest times. Originally it was subdivided into those who pursued their calling in the open sea, and those who fished inland waters; but now this distinction is lost in most districts. The remains of a patriarchal organization of the caste—in whose history many figures prominent politically may be recalled—still exist, for the fishermen acknowledge several hereditary chiefs, each of whom exercises priestly control over a wide extent of coast, and is a final referee in all caste or family disputes. Subsidiary to them are lesser chiefs over groups of villages, and elective headmen presiding each over a single hamlet. These chiefs decide disputes, are present at marriages and religious ceremonies, often arrange the work of the village, collect government dues, and receive fines and fees, much of which the lower officers must pass on to their superiors.

The general degeneracy of the sea-fishing interest caused the Indian government recently to set on foot an investigation, which was placed in the hands of Dr. Francis Day, who recounted his results in an intelligent paper read before the late fisheries exhibition in London. It appears from this that the key to comparative prosperity or misery among this class of the population is found in the word 'salt.' The only object of getting sea-fish, which go in schools, and may be captured in large quantities at a time (beyond the trifle able to be consumed fresh on the shore), is to preserve them for subsequent use. This can be done by drying, which is an uncertain way, and results in greater or less putridity, or by the use of salt. Salt has not only been made from sea-water by native methods since ancient times, but in certain

regions of the coast, as in western Madras, saline earths are found which form an imperfect substitute.

Former British rulers placed a heavy tax not only on the importation and manufacture of good salt, but even taxed the collection of the poor salt-earth: these impositions varied in different districts, and in some have been removed. Surveying the whole seacoast, it is now seen that wherever salt was dear, except in a few places supported by a brisk local demand (as in the vicinity of large cities), the fish-curer's trade was destroyed, and hence the fishermen were greatly depressed, decreasing in numbers, and seeking to become boatmen or sailors; that fish salted with taxed or monopoly salt was simply a luxury for the rich, and valuable as an export, so that the poor had to consume their fish putrid, or save it for a short time by immersing it in sea-water and drying in the sun; and that which is prepared with the salt-earth keeps badly, and predisposes the consumer to disease. The unmistakable result of this tax has been to discourage and lessen, if not wholly to ruin, a large proportion of the food-producing population of the empire. Moreover, it has brought about not only this special harm, but harm to the general public, whose food-supply is thus not only greatly diminished, but is put at an abnormally high price, since all the fishermen have now sunken into the hands of the money-lenders to whose advances of capital they owe their ability to do any thing at all, and to whom the whole catch must be turned over as soon as taken.

The fresh-water fishes differ in many respects from marine ones. Wherever any quantity of fresh water exists in the east, fishes are certain to be found, all the way from sea-level to near the summit of high mountains. In India this is particularly true, and the people fish in rivers, lakes, irrigation canals, tanks, ditches, swamps, and inundated fields; and, as fishing is a less laborious occupation than agriculture, the pursuit is in high favor in those ease-loving latitudes.

In olden times, under native rule, the fisheries were held as royalties, and mostly were let out to contractors, who retained the sole right to sell fish, but issued licenses, on payment, permitting families to catch for their own use. Remains of this custom, in one form or another, still exist. Along the Himalayas, in the Kangra and other districts, the petty rajahs adopted another plan,

selling licenses to supply the markets, and also to catch with small nets for table use. This was the plan in Burmah also, while the erection of weirs was greatly restricted, or, in some regions, prohibited altogether.

Under British rule these regulations have lost force, and notions once distinct as to fishing privileges and rights have become confused. At first fishermen and fishing implements were both taxed, besides the leasing fees of the fishing-grounds. Gradually these were removed, and many fisheries were made free; but this intended boon has proved an evil, as was the case with the sea-fisheries. Now the inland fisheries are open to all. When whole districts were let to contractors, they were not so short-sighted as to permit indiscriminate destruction; but now everybody does as he likes, when he likes, and how he likes. Every device that can be thought of is called into use. As soon as the monsoon has set in, and the fry begin to move, women and children daily search for them in all the sheltered spots to which they retire for rest or hiding. Nets that would not let a mosquito pass, and even solid cloths, are used for raking out the last one of these fingerlings. So soon as fish commence moving up the rivers for the purpose of breeding, so soon begins the work of destruction, aided by every implement of capture which human ingenuity can invent, not even excepting the scooping-up of whole deposits of fresh ova, and the wholesale poisoning of streams. When the few agile survivors have succeeded in running the gauntlet of weirs, traps, wicker baskets, and nets, of every size and shape, these are all reversed, and set in waiting for their return to the sea. The rod-fishing for mahaseer, the principal game-fish of northern India, is utterly ruined in many districts. Even fishes' eggs do not escape the general hunt to which the persecuted finny-tribes are subjected; for these are collected to be made into cakes, which are thought a great delicacy.

The result of all this heedlessness and indiscriminate destruction is already apparent, and is at last exciting the anxious attention of the rulers of India. The professional fishermen of the empire have decreased in numbers, and their villages are declining into deeper and deeper poverty. In the markets fish-food commands a higher rate than naturally belongs to it, and there is prospect of its steady rise. The longer this goes on, the more fish becomes a luxury for the rich, instead of a common resource for the poor, as seems to be its natural level; and it affords to other nations, as well as India, an example of the poor policy of placing no restrictions upon the harvest of sea and river.

ERNEST INGERSOLL.

THE MOUSE-PLAGUE OF BRAZIL.

It is well known that the fauna of America, especially that of the higher animals, presents a large number of peculiar types. Not only many of the lesser groups, but sometimes whole families of cosmopolitan orders, such as apes, opossums, etc., we find distinctly separated from those of the old world by some general peculiarity. The indigenous mice of America differ from those of the eastern hemisphere in some features of dentition, and also show a considerable variance in their habits.

The larger number of all the native species belong to a single genus, *Hesperomys*, of which in Brazil a dozen or more are known, differing in size from that of the ordinary mouse to that of the largest rat. They do not invade dwellings except under unusual circumstances, but mostly live in burrows of greater or less extent; some not less than seven or eight feet in length, widened at the end into a large excavation or chamber, which is filled with grass. They are omnivorous in their habits, feeding indifferently upon grass, seeds, and flesh. Their enemies are numerous, the more important of which are various snakes, and especially the tiger-cat and fox. A large dipterous insect, a bot-fly, is also parasitic upon many, the larvae of which are as large as the end of one's finger, and burrow beneath the skin.

Under ordinary circumstances they are not at all abundant, so that at times naturalists can secure specimens of many species only with difficulty. The almost inconceivable increase and abundance during certain years, to such an extent that they become a national calamity, is thus the more remarkable. In the colony of Lourenço one of these remarkable visitations has thus been described.¹ In the months of May and June, 1876, they suddenly appeared in enormous numbers. They invaded the maize-fields in such great numbers that the corn seemed literally alive with them, destroying in a few days every thing that was edible; and where, but a short time before, bushels of grain might have been harvested, not an ear remained, and the noise produced by their nibbling and climbing was audible for a considerable distance. After the corn-fields were devastated, the potatoes next received their attention. Only the largest were eaten in the ground: such as were transportable were carried away, and hidden in hollow trees or other retreats for future use. Gourds and pumpkins, even the hardest, were gnawed through and eaten. Of green food, such as clover, oats, barley, not a leaf was left standing:

¹ Zur kenntniss der brasilianischen mäuse und mäuse-plagen. Dr. H. von Ihring, *Kosmos*, December, 1885.